

NPOESS PRECISION ORBIT DETERMINATION (POD) USING GPS AND SATELLITE LASER RANGING (SLR) DATA

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The NPOESS (National Polar-orbiting Operational Environment Satellite System) mission is scheduled for first launch in late 2009. The 1730 Local Time of Ascending Node (LTAN) orbit plane will feature a radar altimeter similar to that used on Jason-1, which is used to measure sea surface topography to an accuracy of 4.2 cm. The current NPOESS measurement precision requirement on sea surface topography is 3 cm, and 2 cm radial orbit accuracy was suggested to meet the requirement⁴. This paper presents an in-depth simulation NPOESS POD study that attempts to achieve the 2 cm radial orbit accuracy by on-board and ground-based double-differenced GPS dual-frequency carrier phase data. The radial orbit accuracy is validated by ground-based SLR data. This study adopts the dynamics approach to tune the gravity model using GPS tracking data to reduce the effect of dynamic model errors in the gravity model. The effect of solar radiation pressure model error is also evaluated.

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⁴ Zelensky, N., J. McCarthy, S. Klosko, T. Williams, L. Gehrmann, "NPOESS Precision Orbit Determination (POD) Simulation Analysis", NPOESS ALT OAT Meeting, August 31, 2004, Silver Spring, Maryland.